13. Older Adults: Standards of Care in Diabetes—2025

*American Diabetes Association Professional Practice Committee**

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The American Diabetes Association (ADA) "Standards of Care in Diabetes" includes the ADA's current clinical practice recommendations and is intended to provide the components of diabetes care, general treatment goals and guidelines, and tools to evaluate quality of care. Members of the ADA Professional Practice Committee, an interprofessional expert committee, are responsible for updating the Standards of Care annually, or more frequently as warranted. For a detailed description of ADA standards, statements, and reports, as well as the evidence-grading system for ADA's clinical practice recommendations and a full list of Professional Practice Committee members, please refer to Introduction and Methodology. Readers who wish to comment on the Standards of Care are invited to do so at professional.diabetes.org/SOC.

Recommendations

13.1 Assess the medical, psychological, functional (self-management abilities), and social domains in older adults with diabetes to provide a framework to determine goals and therapeutic approaches for diabetes management. **B**

13.2 Screen at least annually for geriatric syndromes (e.g., cognitive impairment, depression, urinary incontinence, falls, persistent pain, and frailty), hypoglycemia, and polypharmacy in older adults with diabetes, as they may affect diabetes management and diminish quality of life. **B**

Diabetes is a highly prevalent health condition in the aging population. Over 29% of people over the age of 65 years have diabetes (1,2). The number of older adults living with these conditions is expected to increase rapidly in the coming decades. Diabetes in older adults is a highly heterogeneous condition. While type 2 diabetes predominates in the older population as in the younger population, improvements in insulin delivery, technology, and care over the last few decades have led to increasing numbers of people with childhood and adult-onset type 1 diabetes surviving and thriving into their later decades.

Diabetes management in older adults requires regular assessment of medical, psychological, functional, and social domains. When assessing older adults with diabetes, it is important to accurately categorize the type of diabetes as well as other factors, including diabetes duration, the presence of complications, and treatment-related concerns, such as fear of hypoglycemia. Screening for diabetes complications in older adults should be individualized and periodically revisited, as the results of screening tests may impact treatment goals and therapeutic approaches (3–5). Older adults with diabetes have higher rates of functional disability, accelerated muscle loss, mobility impairment, frailty, and coexisting illnesses, such as hypertension, chronic kidney disease, coronary heart disease, stroke, and premature death than those without diabetes. At the same time, older adults with diabetes also require greater caregiver support and are at greater risk than other older adults for

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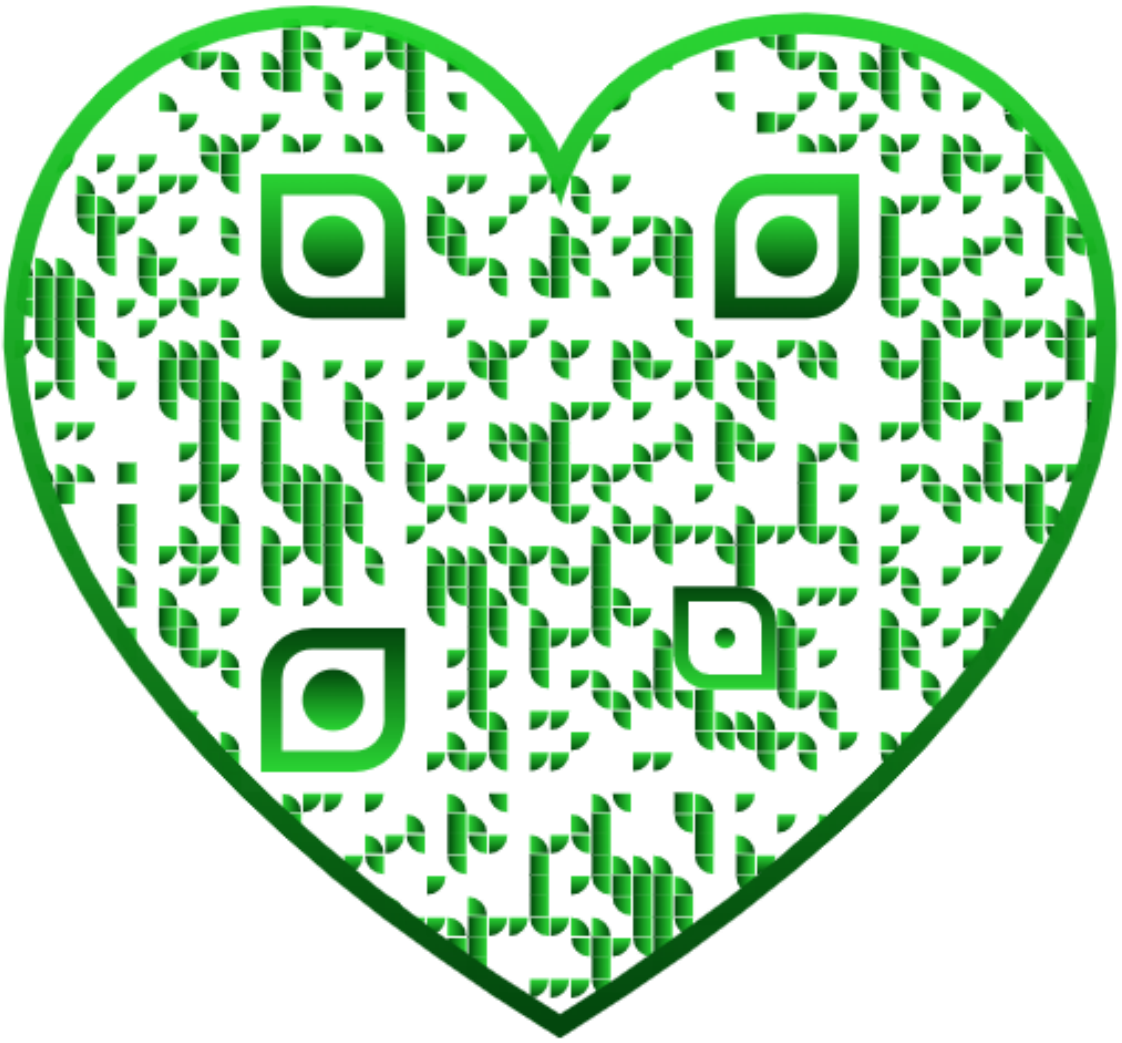

several common geriatric syndromes such as cognitive impairment, depression, urinary incontinence, injurious falls, persistent pain, and frailty as well as polypharmacy (1). These conditions may impact older adults' diabetes self-management abilities and quality of life if left unaddressed (2,6,7). See Section 4, "Comprehensive Medical Evaluation and Assessment of Comorbidities," for the full range of issues to consider when caring for older adults with diabetes. The Institute for Healthcare Improvement has developed an evidence-based "4Ms" framework for age-friendly health care that is being adopted by many health systems caring for older adults. The key elements of this approach to the care of older adults are Mentation, Medications, Mobility, and What Matters Most (person centered), with the understanding that any one of the components may affect another domain (8). This approach has been conceptualized to address person-specific issues that may be interrelated and affect diabetes management in older individuals in **Fig. 13.1**.

The comprehensive assessment described above provides a framework to determine goals and therapeutic approaches (9–11), including whether referral for diabetes self-management education is appropriate (when complicating factors arise or when transitions in care occur) or whether the current plan is too complex for the individual's self-management ability or for the care partners providing care (12). Particular attention should be paid to complications that can develop over short periods of time and/or would significantly impair functional status, such as visual and lower-extremity complications. Please refer to the American Diabetes Association (ADA) consensus report "Diabetes in Older Adults" for details (3).

NEUROCOGNITIVE FUNCTION

Recommendation

13.3 Screening for early detection of mild cognitive impairment or dementia should be performed for adults 65 years of age or older at the initial visit, annually, and as appropriate. **B**

Older adults with diabetes are at higher risk of cognitive decline and institutionalization (13,14). Presentation of cognitive impairment ranges from subtle executive dysfunction to memory loss to overt dementia. People with diabetes have higher incidences of all-cause dementia, Alzheimer disease, and vascular dementia than people without diabetes (15). Both hyperglycemia and hypoglycemia are associated with a decline in cognitive function (16–18), and longer duration of diabetes is associated with worsening cognitive function. A newly recognized clinical entity, diabetes-related dementia, is emerging as distinct from Alzheimer disease and vascular dementia. Diabetes-related dementia is characterized by a slower progression of dementia, absence of typical neuroimaging findings, advanced age, elevated A1C levels, long duration of diabetes, high frequency of insulin use, frailty, sarcopenia, and dynapenia (loss of muscle strength not caused by neurologic or muscular diseases) (18). Ongoing studies are evaluating whether lifestyle interventions may help to maintain cognitive function in older adults (19). However, studies on diabetes prevention or intensive glycemic and blood pressure management have not demonstrated a reduction in cognitive decline (20,21). A recent systematic review and meta-analysis showed that glucose-lowering drugs, such as thiazolidinediones, glucagon-like peptide 1 receptor agonists (GLP-1 RAs) and sodium–glucose cotransporter 2 (SGLT2) inhibitors, have shown small benefits on slowing progression of cognitive decline (22). Cardiovascular risk factors are also associated with an increased risk of cognitive decline and

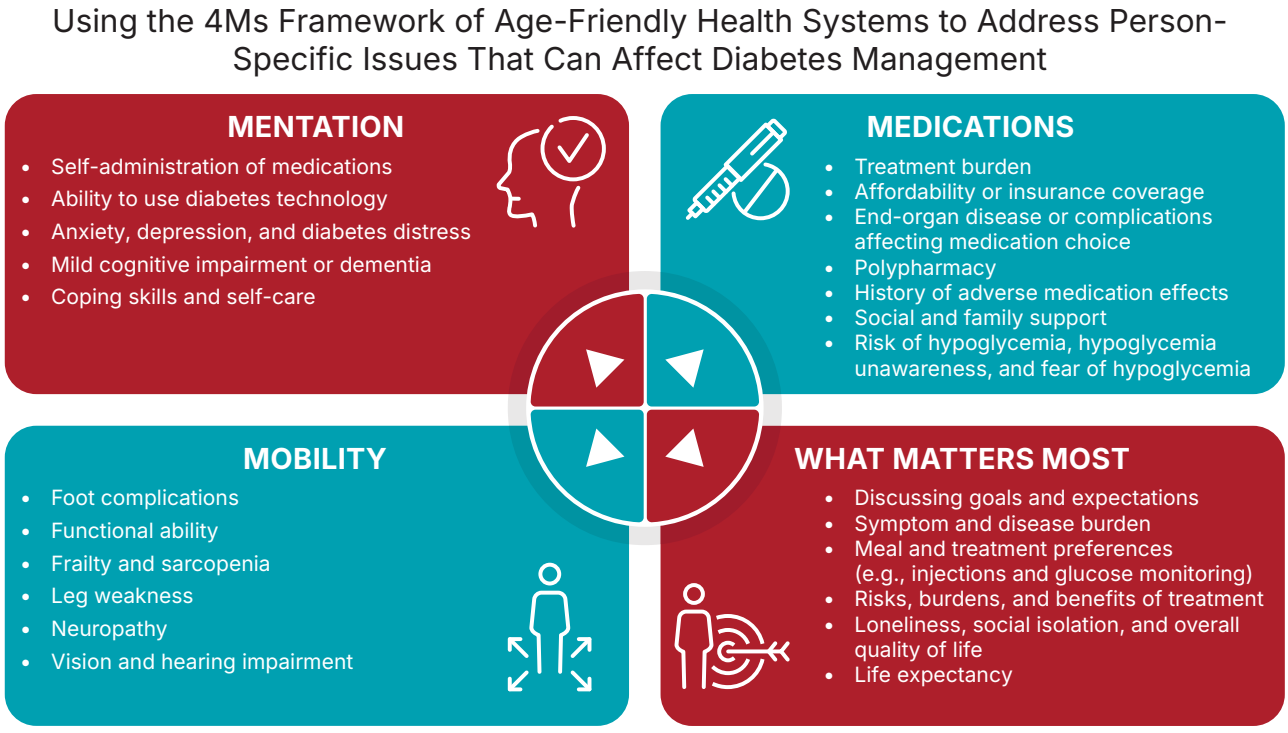
Using the 4Ms Framework of Age-Friendly Health Systems to Address Person-Specific Issues That Can Affect Diabetes Management
MENTATION
Self-administration of medications
Ability to use diabetes technology
Anxiety, depression, and diabetes distress
Mild cognitive impairment or dementia
Coping skills and self-care
MEDICATIONS
Treatment burden
Affordability or insurance coverage
End-organ disease or complications affecting medication choice
Polypharmacy
History of adverse medication effects
Social and family support
Risk of hypoglycemia, hypoglycemia unawareness, and fear of hypoglycemia
MOBILITY
Foot complications
Functional ability
Frailty and sarcopenia
Leg weakness
Neuropathy
Vision and hearing impairment
WHAT MATTERS MOST
Discussing goals and expectations
Symptom and disease burden
Meal and treatment preferences (e.g., injections and glucose monitoring)
Risks, burdens, and benefits of treatment
Loneliness, social isolation, and overall quality of life
Life expectancy

Figure 13.1—Using the 4Ms framework of age-friendly health systems to address person-specific issues that can affect diabetes management.

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dementia. Management of blood pressure and cholesterol lowering with statins have been associated with a reduced risk of incident dementia and are, thus, particularly important in older adults with diabetes.

Recently, the U.S. Food and Drug Administration (FDA) approved two new anti-amyloid monoclonal antibodies for the treatment of early Alzheimer disease (23,24). While these drugs lower the amyloid burden in the brain and appear to slow cognitive decline, the slowing is modest and of unclear significance and duration. In addition, a substantial minority of individuals developed imaging abnormalities consistent with brain edema or hemorrhage. Whether these drugs will provide net benefit for older adults with diabetes remains to be determined.

Identifying cognitive impairment early has important implications for diabetes care. The presence of cognitive impairment can make it challenging for health care professionals to help people with diabetes reach individualized glycemic, blood pressure, and lipid goals. Cognitive dysfunction may make it difficult for individuals to perform complex self-care tasks (25), such as monitoring glucose and administering and adjusting insulin doses. Also, it can hinder their ability to appropriately maintain the timing and nutritional content of their meals. These factors increase risk for hypoglycemia, which, in turn, can worsen cognitive function and have multiple other adverse effects in older individuals with diabetes. When clinicians are providing care for people with cognitive dysfunction, it is critical to simplify care plans and to ascertain and engage the appropriate support structure to assist individuals in all aspects of care.

Older adults with diabetes should be carefully screened and monitored for cognitive impairment (2). Several simple assessment tools are available to screen for cognitive impairment (25,26), such as the Mini-Mental State Examination (27), Mini-Cog (28), and the Montreal Cognitive Assessment (29), which may help to identify individuals requiring neuropsychological evaluation, particularly when dementia is suspected (i.e., in those experiencing memory loss, a decrease in executive function, and declines in their basic and instrumental activities of daily living). Annual screening is indicated for adults 65 years of age or older for early detection of mild cognitive impairment or dementia (4,30). Screening for cognitive impairment should also be considered when an individual presents with a significant decline in clinical status due to increased problems with self-care activities and medication management, such as errors in calculating insulin dose, difficulty counting carbohydrates, skipped meals, skipped insulin doses, and difficulty recognizing, preventing, or treating hypoglycemia. People who screen positive for cognitive impairment should receive diagnostic assessment as appropriate, including referral to a behavioral health professional for formal cognitive and neuropsychological evaluation if indicated and feasible (31).

HYPOGLYCEMIA

Recommendations

13.4 Ascertain and address episodes of hypoglycemia at routine visits because older adults with diabetes have a greater risk of hypoglycemia, especially when treated with hypoglycemic agents (e.g., sulfonylureas, meglitinides, and insulin). **B**

13.5 Recommend continuous glucose monitoring (CGM) for older adults with type 1 diabetes to improve glycemic outcomes, reduce hypoglycemia, and reduce treatment burden. **A**

13.6 Offer CGM for older adults with type 2 diabetes on insulin therapy to improve glycemic outcomes and reduce hypoglycemia. **B**

13.7 Consider the use of automated insulin delivery systems, **A** mechanical insulin delivery systems, **E** and other advanced insulin delivery devices such as connected pens **E** to reduce risk of hypoglycemia for older adults, based on individual ability and support system.

Older adults may be at higher risk of hypoglycemia for many reasons, including irregular meal intake, insulin deficiency necessitating insulin therapy, and worsening kidney function (32). As described above, older adults have higher rates of unidentified cognitive impairment and dementia, leading to difficulties in performing complex self-care activities (e.g., glucose monitoring and insulin dose adjustment). Cognitive decline has been associated with increased risk of hypoglycemia, and conversely, severe hypoglycemia has been linked to increased risk of dementia (33–35). Therefore, as discussed in Recommendation 13.3, it is important to routinely screen older adults for cognitive impairment and dementia and discuss findings with the individuals and their care partners.

People with diabetes and their care partners should be routinely queried about their history of hypoglycemic events, impaired hypoglycemia awareness, and fear of hypoglycemia as discussed in Section 6, "Glycemic Goals and Hypoglycemia." Older adults can also be stratified for future risk for hypoglycemia with validated risk calculators (e.g., Kaiser Hypoglycemia Model for adults with type 2 diabetes) (36) and with consideration of hypoglycemia risk factors (**Table 6.5**). An important step to mitigate hypoglycemia risk is to determine whether the person with diabetes is skipping meals or inadvertently repeating doses of their medications. Glycemic goals and pharmacologic treatments may need to be adjusted to minimize the occurrence of hypoglycemic events (2). This recommendation is supported by results from multiple randomized controlled trials, such as the Action to Control Cardiovascular Risk in Diabetes (ACCORD) study and the Veterans Affairs Diabetes Trial (VADT), which showed that intensive treatment protocols aimed to achieve an A1C $<6.0\%$ with complex drug plans significantly increased the risk for hypoglycemia requiring assistance compared with standard treatment (37,38). However, these intensive treatment plans included extensive use of insulin and minimal use of GLP-1 RAs, and they preceded the availability of SGLT2 inhibitors.

Use of Continuous Glucose Monitoring and Advanced Insulin Delivery Devices

For older adults with type 1 diabetes, continuous glucose monitoring (CGM) is a useful approach to predicting and reducing the risk of hypoglycemia (39). In the Wireless Innovation in Seniors with Diabetes Mellitus (WISDM) trial, adults over 60 years of age with type 1 diabetes were randomized to CGM or standard blood glucose monitoring. Over 6 months, use of CGM resulted in a small but statistically significant reduction in time spent with hypoglycemia (glucose level <70 mg/dL) compared with standard blood glucose monitoring (adjusted treatment difference -1.9% [-27 min/day]; 95% CI -2.8% to

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−1.1% [−40 to −16 min/day]; $P < 0.001$) (40,41). Among secondary outcomes, time spent in range between 70 and 180 mg/dL increased by 8% (95% CI 6.0–11.5) and glycemic variability (%CV) decreased. In the 6-month trial extension, these benefits were sustained for up to a year (42). These and other short-term trials are supported by observational data from the Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications (DCCT/EDIC) study indicating that among older adults (mean age 58 years) with long-standing type 1 diabetes, routine CGM and insulin pump use was associated with fewer hypoglycemic events and hyperglycemic excursions and lower A1C levels (43). While the current evidence base for older adults is primarily in type 1 diabetes, the evidence demonstrating the clinical benefits of CGM for people with type 2 diabetes using insulin is growing (44) (see Section 7, "Diabetes Technology"). The DIAMOND (Multiple Daily Injections and Continuous Glucose Monitoring in Diabetes) study demonstrated that in adults ≥60 years of age with either type 1 or type 2 diabetes using multiple daily injections of insulin, CGM use was associated with improved A1C and reduced glycemic variability (45). An analysis of the results of the MOBILE study, which focused on adults aged ≥65 years and compared CGM with blood glucose meter monitoring, showed that the mean A1C change at 8 months was greater in older adults than in younger adults (−0.65% vs. –0.35%) with type 2 diabetes treated with basal insulin and oral glucose-lowering agents. Similarly, the increase in time in range (TIR) at 8 months was greater in the older adult group than in the younger adult group (19% vs. 12%, $P = 0.01$) and the decrease in time above range was greater in the older adult group as well, which shows that CGM benefits extend to older adults with type 2 diabetes who are non-intensively treated (46). Older adults with physical or cognitive limitations who require monitoring of blood glucose by a surrogate or reside in group homes or assisted living facilities are other populations for which CGM may play a useful role.

The availability of accurate CGM devices that can communicate with insulin pumps through Bluetooth has enabled the development of advanced insulin delivery algorithms for pumps. These algorithms fall into two categories: predictive low-glucose suspend algorithms that automatically shut off insulin delivery if a hypoglycemic event is imminent and hybrid closed-loop algorithms that automatically adjust insulin infusion rates based on feedback from a CGM to keep glucose levels in a goal range. Advanced insulin delivery devices have been shown to improve glycemic outcomes in both children and adults with type 1 diabetes. Most trials of these devices have included people with type 1 diabetes but relatively few older adults; however, data from two small randomized controlled trials in older adults are available. The Older Adult Closed Loop (ORACL) trial in 30 older adults (mean age 67 years) with type 1 diabetes found that an automated insulin delivery (AID) strategy was associated with significant improvements in TIR compared with sensor-augmented pump therapy (47). Moreover, they found small but significant decreases in hypoglycemia with the AID strategy. Boughton et al. (48) reported results of an open-label, crossover design clinical trial in 37 older adults (≥60 years) in which 16 weeks of treatment with a hybrid closed-loop advanced insulin delivery system was compared with sensor-augmented pump therapy. They found that hybrid closed-loop insulin delivery improved the proportion of time glucose was in range largely due to decreases in hyperglycemia. In contrast to the ORACL study, no significant differences in hypoglycemia were observed. Both studies enrolled older individuals whose blood glucose was relatively well managed (mean A1C ∼7.4%), and both used a crossover design comparing hybrid closed-loop insulin delivery to sensor-augmented pump therapy. A recent randomized controlled trial of older adults with type 2 diabetes using multiple daily injections who were unable to manage insulin therapy on their own revealed an increase of TIR of 27% over 12 weeks of AID use in addition to tailored home health care services (49).

These trials provide the first evidence that older individuals with long-standing type 1 and type 2 diabetes can successfully use advanced insulin delivery technologies to improve glycemic outcomes, as has been seen in younger populations. A recent real world evidence analysis of a Medicare population (n = 4,243, 89% with type 1 diabetes, mean age 67.4 years) also indicated that initiating hybrid closed-loop insulin delivery was associated with improvements in mean glucose and a 10% increase in TIR (50). Use of such technologies should be periodically reassessed, as the burden may outweigh the benefits in those with declining cognitive or functional status.

TREATMENT GOALS

Recommendations

13.8a Older adults with diabetes who are otherwise healthy with few and stable coexisting chronic illnesses and intact cognitive and functional status should have lower glycemic goals (such as A1C <7.0–7.5% [<53–58 mmol/mol]) and/or time in range [TIR] 70–180 mg/dL [3.9–10.0 mmol] of ∼70% and time below range ≤70 mg/dL [3.9 mmol/L] of ≤4%) if CGM is used. **C**

13.8b Older adults with diabetes and intermediate or complex health are clinically heterogeneous with variable life expectancy. Selection of glycemic goals should be individualized and should prioritize avoidance of hypoglycemia, with less stringent goals (such as A1C <8.0% [<64 mmol/mol] and/or TIR 70–180 mg/dL [3.9–10.0 mmol] of ∼50% and time below range <70 mg/dL [3.9 mmol/L] of <1%) for those with significant cognitive and/or functional limitations, frailty, severe comorbidities, and a less favorable risk-to-benefit ratio of diabetes medications. **C**

13.8c Older adults with very complex or poor health receive minimal benefit from stringent glycemic goals. Clinicians should focus on avoiding hypoglycemia and symptomatic hyperglycemia rather than achieving stringent glycemic goals. **C**

13.9 Screening for diabetes complications should be individualized in older adults with diabetes. Particular attention should be paid to complications that would lead to impairment of functional status or quality of life. **C**

13.10 Treatment of hypertension to individualized goal levels is indicated in most older adults with diabetes. **B**

13.11 Treatment of other cardiovascular risk factors should be individualized in older adults with diabetes, considering the time frame of benefit. Lipid-lowering therapy and antiplatelet agents may benefit those with life expectancies at least equal to the time frame of primary prevention or secondary intervention trials. **E**

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The care of older adults with diabetes is complicated by their clinical, cognitive, and functional heterogeneity and their varied prior experience with disease management. Some older individuals may have developed diabetes years earlier and have significant complications, others are newly diagnosed and may have had years of undiagnosed diabetes with resultant complications, and still, other older adults may have truly recent-onset disease with few or no complications (51). Some older adults with diabetes have other underlying chronic conditions, substantial diabetes-related comorbidity, limited cognitive or physical functioning, or frailty (52,53). Other older individuals with diabetes have little comorbidity and are active.

Life expectancy is affected by the age of the individual, disease burden, and degree of disability. Multiple prognostic tools for life expectancy for older adults are available (54,55). Notably, the Life Expectancy Estimator for Older Adults with Diabetes (LEAD) tool was developed and validated among older adults with diabetes, and a high risk score was strongly associated with having a life expectancy of $<$5 years (56). These data may be a useful starting point to inform decisions about selecting less stringent glycemic goals (56,57). Older adults also vary in their preferences for the intensity and mode of glucose management (58). Health care professionals caring for older adults with diabetes must take this heterogeneity into consideration when setting and prioritizing treatment goals (10,11) (**Table 13.1**). In addition, older adults with diabetes should be assessed for disease treatment and self-management knowledge, health literacy, and mathematical literacy (numeracy) at the onset and throughout treatment. See **Fig. 6.2** for individual/disease-related factors to consider when determining individualized glycemic goals.

A1C results may be inaccurate in those who have received blood transfusions and who have medical conditions that impact red blood cell turnover (see Section 2, "Diagnosis and Classification of Diabetes," for additional details on the limitations of A1C) (59). Conditions affecting red blood cell turnover that are common in older adults include end-stage kidney disease, recent significant blood loss, and erythropoietin therapy. In these instances, blood glucose monitoring and/or CGM should be used for glycemic goal setting (**Table 13.1**). Serum glycated protein assays such as fructosamine may also be useful for glycemic monitoring in conjunction with other measures (see Section 6, "Glycemic Goals and Hypoglycemia") (60–62).

Older Adults With Good Functional Status and Without Complications

There are few long-term studies in older adults demonstrating the benefits of intensive glycemic, blood pressure, and lipid management. Older adults who can be expected to live long enough to realize the benefits of long-term intensive diabetes management, who have good cognitive and physical function, and who choose to do so via shared decision-making may be treated using therapeutic interventions and goals similar to those for younger adults with diabetes (**Table 13.1**).

As for all people with diabetes, diabetes self-management education and ongoing diabetes self-management support are vital components of diabetes care for older adults and their caregivers. Self-management knowledge and skills should be reassessed following a significant clinical change or hospitalization, when treatment plan changes are made, or when an individual's functional abilities diminish. In addition, declining or impaired ability to perform diabetes self-care behaviors may be an indication that an older person with diabetes needs a referral for cognitive and physical functional assessment, using age-normalized evaluation tools, as well as help establishing a support structure for diabetes care (3,31).

Older Adults With Complications and Reduced Functionality

Older adults with diabetes categorized as having complex or intermediate health (**Table 13.1**) are heterogeneous with respect to their function and life expectancy (63–65). Based on concepts of competing mortality and time to benefit, some people in this category with shorter life expectancy will have less benefit from glucose lowering and should have less stringent glycemic goals (66). This is especially true for individuals with advanced diabetes complications, life-limiting comorbid illnesses, frailty, or substantial cognitive or functional impairments. These individuals are also more likely to experience serious adverse effects of therapeutics, such as hypoglycemia (67). However, those with poorly managed diabetes may be subject to acute complications of diabetes, including dehydration, poor wound healing, and hyperglycemic crises. Glycemic goals should, at a minimum, avoid these consequences. Factors to consider for individualizing glycemic goals are outlined in **Fig. 6.2** and **Fig. 13.1** (4Ms framework). Clinicians should also consider the balance of risks and benefits of an individual's diabetes medications, including disease-specific benefits (such as reducing symptomatic heart failure or stabilizing chronic kidney disease) and burdens such as hypoglycemia risk, tolerability, difficulties of administration, inadequate support system, and financial cost. In addition, attention to oral health, vision and hearing loss, foot care, fall prevention, and early detection of depression will improve quality of life.

While **Table 13.1** provides overall guidance for identifying complex and very complex individuals, there is not yet global consensus on geriatric people classification. Ongoing empiric research on the classification of older adults with diabetes based on comorbid illness has repeatedly found three major classes of individuals: a healthy, a geriatric, and a cardiovascular class (10,63,68). The geriatric class has the highest prevalence of obesity, hypertension, arthritis, and incontinence, and the cardiovascular class has the highest prevalence of myocardial infarctions, heart failure, and stroke. Compared with the healthy class, the cardiovascular class has the highest risk of frailty and subsequent mortality. Additional research is needed to develop a reproducible classification scheme to distinguish the natural history of disease as well as differential response to glucose management and specific glucose-lowering agents (69).

Vulnerable Older Adults at the End of Life

For people with diabetes receiving palliative care and end-of-life care, the focus should be to avoid hypoglycemia and symptomatic hyperglycemia while reducing the burdens of glycemic management. Thus, as organ failure develops, the treatment plan will have to be deintensified and one or more agents will need to be discontinued. At the end of life, most agents for type 2 diabetes may be removed (70). There is, however, no consensus for the management of type 1 diabetes in this scenario (71). Consultation with a geriatric specialist might be warranted to

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Table 13.1—Framework for considering treatment goals for glycemia, blood pressure, and dyslipidemia in older adults with diabetes

Characteristics and health status of person with diabetes	Rationale	Reasonable A1C goal*	Reasonable CGM goals	Fasting or preprandial glucose	Bedtime glucose	Blood pressure	Lipids
Healthy (few coexisting chronic illnesses, intact cognitive and functional status)	Longer remaining life expectancy	<7.0–7.5% (<53–58 mmol/mol)	TIR 70–180 mg/dL (3.9–10.0 mmol) of ~70%, and TBR <70 mg/dL (3.9 mmol/L) of <4%)	80–130 mg/dL (4.4–7.2 mmol/L)	80–180 mg/dL (4.4–10.0 mmol/L)	<130/80 mmHg	Statin, unless contraindicated or not tolerated
Complex/intermediate (multiple coexisting chronic illnesses† or two or more ADL impairments or mild to moderate cognitive impairment)	Variable life expectancy. Individualize goals, considering: • Severity of comorbidities • Cognitive and functional limitations • Frailty • Risk-to-benefit ratio of diabetes medications • Individual preference	<8.0% (<64 mmol/mol)	TIR 70–180 mg/dL (3.9–10.0 mmol) of ~50% and TBR <70 mg/dL (3.9 mmol/L) of <1%	90–150 mg/dL (5.0–8.3 mmol/L)	100–180 mg/dL (5.6–10.0 mmol/L)	<130/80 mmHg	Statin, unless contraindicated or not tolerated
Very complex/poor health (LTC or end-stage chronic illnesses‡ or moderate to severe cognitive impairment or two or more ADL impairments)	Limited remaining life expectancy makes benefit minimal	Avoid reliance on A1C; glucose management decisions should be based on avoiding hypoglycemia and symptomatic hyperglycemia		100–180 mg/dL (5.6–10.0 mmol/L)	110–200 mg/dL (6.1–11.1 mmol/L)	<140/90 mmHg	Consider likelihood of benefit with statin

This table represents a consensus framework for considering treatment goals for glycemia, blood pressure, and dyslipidemia in older adults with diabetes. The characteristic categories are general concepts. Not every individual will clearly fall into a particular category. Consideration of individual and care partner preferences, care partner engagement, abilities, and resources is an important aspect of treatment individualization. Additionally, an individual's health status and preferences may change over time. ADL, activities of daily living; CGM, continuous glucose monitoring; LTC, long-term care; TBR, time below range; TIR, time in range. *A lower A1C goal may be set for an individual if achievable without recurrent or severe hypoglycemia or undue treatment burden. †Coexisting chronic illnesses are conditions serious enough to require medications or lifestyle management and may include arthritis, cancer, heart failure, depression, emphysema, falls, hypertension, incontinence, stage 3 or worse chronic kidney disease, myocardial infarction, and stroke. "Multiple" means at least three, but many individuals may have five or more (77). ‡The presence of a single end-stage chronic illness, such as stage 3–4 heart failure or oxygen-dependent lung disease, chronic kidney disease requiring dialysis, or uncontrolled metastatic cancer, may cause significant symptoms or impairment of functional status and significantly reduce life expectancy. Adapted from Kirkman et al. (3).

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assist with complex medical and functional issues as well as advance care planning. See the section END-OF-LIFE CARE below for additional information.

Beyond Glycemic Management

Although minimizing hyperglycemia may be important in older individuals with diabetes, greater reductions in morbidity and mortality are likely to result from a clinical focus on comprehensive cardiovascular risk factor modification. There is strong evidence from clinical trials of the value of treating hypertension in older adults (72,73), with treatment of hypertension to individualized target levels indicated in most. There is less evidence for lipid-lowering therapy and aspirin therapy, although the benefits of these interventions for primary and secondary prevention are likely to apply to older adults whose life expectancies equal or exceed the time frames of the clinical trials (74). In the case of statins, the follow-up time of clinical trials ranged from 2 to 6 years. While the time frame of trials can be used to inform treatment decisions, a more specific concept is the time to benefit for a therapy. For statins, a meta-analysis of the previously mentioned trials showed that the time to benefit is 2.5 years (75).

LIFESTYLE MANAGEMENT

Recommendations

13.12 Recommend healthful eating with adequate protein intake for older adults with diabetes. Recommend regular exercise, including aerobic activity, weight-bearing exercise, and/or resistance training as tolerated in those who can safely engage in such activities. **B**

13.13 For older adults with type 2 diabetes, overweight or obesity, and capacity to exercise safely, an intensive lifestyle intervention focused on dietary changes, physical activity, and modest weight loss (e.g., 5–7%) should be considered for its benefits on quality of life, mobility and physical functioning, and cardiometabolic risk. **A**

Lifestyle management in older adults should be tailored to frailty status. Diabetes in the aging population is associated with reduced muscle strength, poor muscle quality, and accelerated loss of muscle mass, which may result in sarcopenia or dynapenia (76) and/or osteopenia (77,78). Diabetes is also recognized as an independent risk factor for frailty. Frailty is characterized by decline in physical performance and an increased risk of negative health outcomes due to physiologic vulnerability and functional or psychosocial stressors. Inadequate nutritional intake, particularly inadequate protein intake, can increase the risk of sarcopenia and frailty in older adults. Special attention should be paid to malnutrition or the risk of malnutrition in older adults with diabetes given its association with sarcopenia (79,80). Malnutrition is also associated with decreases in activities of daily living, grip strength, physical performance of lower limbs, cognition, and quality of life (81–83). See Section 5, "Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes," for a description of malnutrition and screening recommendations. Management of malnutrition, sarcopenia, and frailty in diabetes includes optimal nutrition with adequate protein intake combined with an exercise program that includes aerobic, weight-bearing, and resistance training. The benefits of a structured exercise program (as in the Lifestyle Interventions and Independence for Elders [LIFE] study) in frail older adults include reducing sedentary time, preventing mobility disability, and reducing frailty (84). The goal of these programs is not weight loss but enhanced functional status. For nonfrail older adults with type 2 diabetes and overweight or obesity, an intensive lifestyle intervention designed to reduce weight is beneficial across multiple outcomes. The Look AHEAD (Action for Health in Diabetes) trial is described in Section 8, "Obesity and Weight Management for the Prevention and Treatment of Type 2 Diabetes." Look AHEAD specifically excluded individuals with a low functional status. It enrolled people between 45 and 74 years of age and required that they be able to perform a maximal exercise test (85,86). While the Look AHEAD trial did not achieve its primary outcome of reducing cardiovascular events, the intensive lifestyle intervention had multiple clinical benefits that are important to the quality of life of older adults. Benefits included weight loss, improved physical fitness, increased HDL cholesterol, lowered systolic blood pressure, reduced A1C levels, reduced waist circumference, and reduced need for medications (87). Additionally, several subgroups, including participants who lost at least 10% of baseline body weight at year 1, had improved cardiovascular outcomes (88). Risk factor management was improved with reduced utilization of antihypertensive medications, statins, and insulin (89). In age-stratified analyses, older adults in the trial (60 to early 70s) had similar benefits compared with younger people (90,91). In addition, lifestyle intervention produced benefits on aging relevant outcomes, such as reductions in multimorbidity and improvements in physical function and quality of life (92–95).

PHARMACOLOGIC THERAPY

Recommendations

13.14 Select medications with low risk of hypoglycemia in older adults with type 2 diabetes, specifically for those with hypoglycemia risk factors. **B**

13.15 Overtreatment of diabetes is common in older adults and should be avoided. **B**

13.16a Deintensify hypoglycemia-causing medications (e.g., insulin, sulfonylureas, or meglitinides) or switch to a medication class with low hypoglycemia risk for individuals who are at high risk for hypoglycemia, using individualized glycemic goals. **B**

13.16b In older adults with diabetes, deintensify diabetes medications for individuals for whom the harms and/or burdens of treatment may be greater than the benefits, within individualized glycemic goals. **E**

13.16c Simplify complex treatment plans (especially insulin) to reduce the risk of hypoglycemia and polypharmacy and decrease the treatment burden if it can be achieved within the individualized glycemic goals. **B**

13.16d In older adults with type 2 diabetes and established or high risk of atherosclerotic cardiovascular disease, heart failure, and/or chronic kidney disease, the treatment plan should include agents that reduce cardiovascular and kidney disease risk, irrespective of glycemia. **A**

13.17 Consider costs of care and coverage when developing treatment plans in order to reduce risk of cost-related barriers to medication taking and self-management behaviors. **B**

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Special care is required in prescribing and monitoring pharmacologic therapies in older adults (96), who are at high risk of polypharmacy, have difficulties in maintaining prescribed medication plans, and may have cognitive impairment and functional impairment. Therapeutic choices should take into consideration whether older adults with diabetes live independently, have an engaged care partner, or live in a skilled nursing facility, assisted living facility, or group home. See **Fig. 9.3** for general recommendations regarding glucose-lowering treatment for adults with type 2 diabetes and **Table 9.2** for person- and drug-specific factors to consider when selecting glucose-lowering agents. Cost may be an especially important consideration, as older adults tend to be on many medications and live on fixed incomes (97). Accordingly, the costs of care and insurance coverage rules should be considered when developing treatment plans to reduce the risk of cost-related barriers to use (98,99). See **Table 9.3** and **Table 9.4** for median monthly cost in the U.S. of noninsulin glucose-lowering agents and insulin, respectively. It is important to match complexity of the treatment plan to the self-management ability of older adults with diabetes and their available social and medical support. Many older adults with diabetes struggle to maintain the frequent blood glucose monitoring and insulin injection plans they previously followed, perhaps for many decades, as they develop medical conditions that may impair their ability to follow their treatment plan safely. Individualized glycemic goals should be established (**Fig. 6.2** and **Table 13.1**) and periodically adjusted based on coexisting chronic illnesses, cognitive function, functional status, life expectancy, and risk of complications (2). Intensive glycemic management with medication plans including insulin and sulfonylureas in older adults with complex medical conditions has been identified as overtreatment and found to be very common in clinical practice (100–104) and may increase the risk of mortality (37). Ultimately, the determination of whether a person is considered overtreated requires an elicitation of the person's perceptions of the current medication burden and preferences for treatments. For those seeking to simplify their diabetes medication plan, deintensification of plans in individuals taking noninsulin glucose-lowering medications can be achieved by either lowering the dose or discontinuing some medications, as long as individualized glycemic goals are maintained (105). When older adults are found to have an insulin plan with complexity beyond their self-management abilities, lowering the dose of insulin may not be adequate (106). Simplification of the insulin plan to match an individual's self-management abilities and their available social and medical support in these situations has been shown to reduce hypoglycemia and disease-related distress without worsening glycemic outcomes (107–110). **Figure 13.2** depicts an algorithm that can be used to simplify the insulin administration plan (109). There are now multiple studies evaluating deintensification protocols in diabetes as well as hypertension, demonstrating that deintensification is safe and possibly beneficial for older adults (105). **Table 13.2** provides examples of and rationale for situations where deintensification and/or insulin plan simplification may be appropriate in older adults.

Metformin

Metformin is a treatment option for older adults with type 2 diabetes if prescription guidelines are followed carefully. Metformin may be used safely in individuals with an estimated glomerular filtration rate (eGFR) $\geq$30 mL/min/1.73 m^2 (111), while lower doses may be used in those with an eGFR 30–45 mL/min/1.73 m^2. eGFR should be monitored every 3 to 6 months in those at risk for decline in kidney function. However, it is contraindicated in those with advanced renal insufficiency and should be used with caution in those with hypoperfusion, hypoxemia, impaired hepatic function, or heart failure because of the increased risk of lactic acidosis. Metformin may be temporarily discontinued before procedures including imaging studies using iodinated contrast, during hospitalizations, and when acute illness may compromise renal or liver function. Additionally, metformin can cause gastrointestinal side effects and a reduction in appetite that can be problematic for some older adults. The daily dose should be slowly increased to minimize gastrointestinal side effects, and reduction or elimination of metformin may be necessary for those experiencing persistent gastrointestinal side effects. For those taking metformin long term, monitoring for vitamin B12 deficiency should be considered (112). Extended-release formulation may be used as an alternative to immediate-release formulation in older adults experiencing difficulties in maintaining medication plans or gastrointestinal effects.

Pioglitazone

Pioglitazone, if used at all, should be used very cautiously in older adults on insulin therapy as well as in those with or at risk for heart failure, fluid retention, weight gain, osteoporosis, falls or fractures, and/or macular edema (113,114). Lower doses of pioglitazone in combination therapy may mitigate these side effects.

Insulin Secretagogues

Sulfonylureas and other insulin secretagogues such as the meglitinides (repaglinide and nateglinide) are associated with hypoglycemia, bone loss (115), and fracture risk (116) and should be used with caution. If used, sulfonylureas with a shorter duration of action, such as glipizide, are preferred, and frequency of hypoglycemia monitored at each visit. Glyburide is a longer-acting sulfonylurea and should be avoided in older adults (117). Many antimicrobials (most commonly fluroquinolones and sulfamethoxazole-trimethoprim) interact with sulfonylureas to increase the effective sulfonylurea dose, which may precipitate hypoglycemia (118–120). Sulfonylureas should be reduced or temporarily discontinued in these circumstances.

Incretin-Based Therapies

Oral dipeptidyl peptidase 4 (DPP-4) inhibitors have few side effects and minimal risk of hypoglycemia, but their cost may be a barrier to some older adults. DPP-4 inhibitors are relatively weak agents and do not reduce or increase major adverse cardiovascular outcomes generally, and there is no interaction by age-group (121). A challenge of interpreting the age-stratified analyses of this drug class and other cardiovascular outcomes trials is that while most of these analyses were prespecified, they were not powered to detect differences. In general, these medications may be useful in older adults with mild hyperglycemia or with high risk of hypoglycemia, or when metformin is contraindicated. Among DPP-4 inhibitors, linagliptin may be used as alternative to metformin in older adults with low GFR.

GLP-1 RAs have demonstrated cardiovascular benefits among people with

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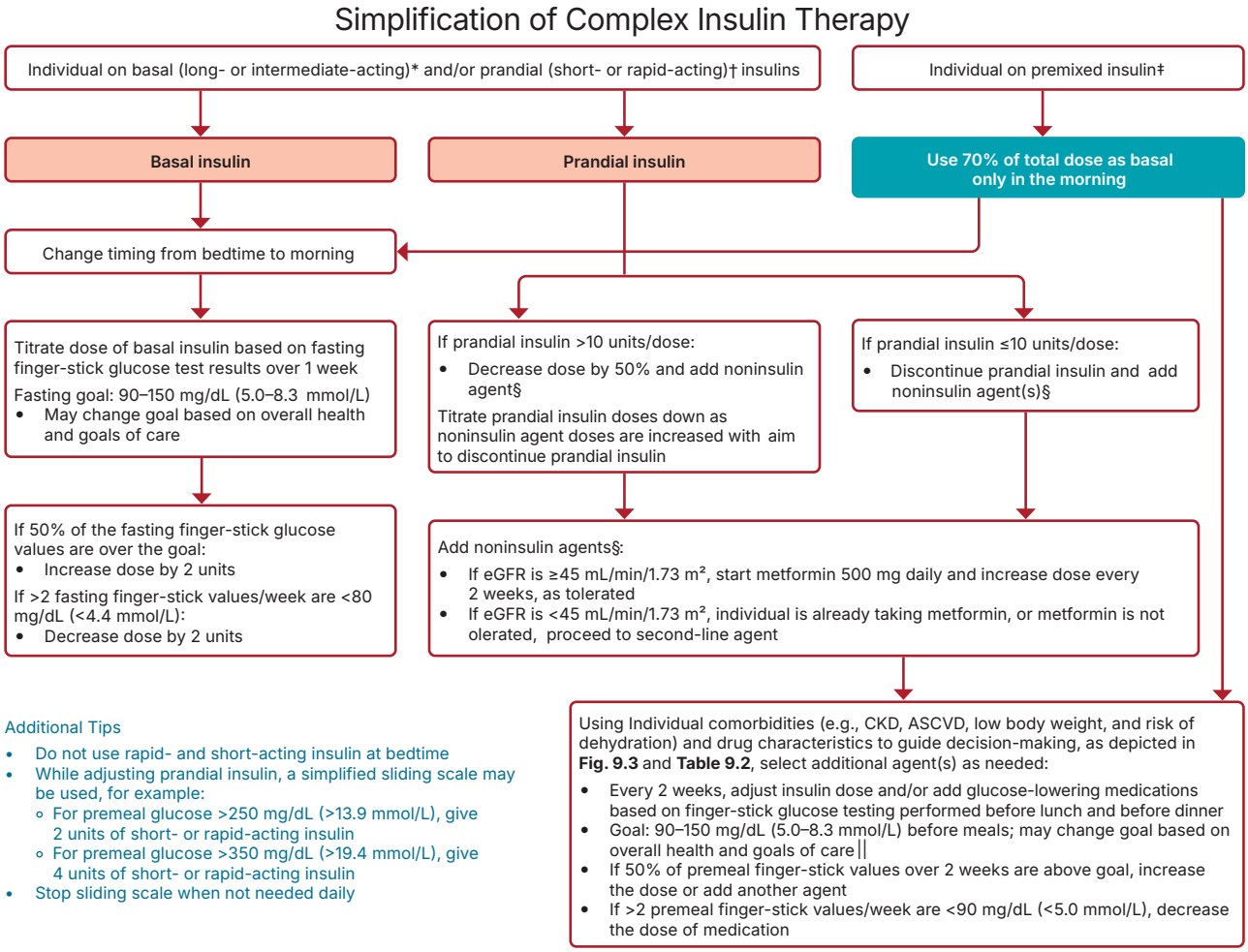
Simplification of Complex Insulin Therapy
Individual on basal (long- or intermediate-acting)* and/or prandial (short- or rapid-acting)† insulins
Individual on premixed insulin‡
Basal insulin
Prandial insulin
Use 70% of total dose as basal only in the morning
Change timing from bedtime to morning
Titrate dose of basal insulin based on fasting finger-stick glucose test results over 1 week
Fasting goal: 90–150 mg/dL (5.0–8.3 mmol/L)
• May change goal based on overall health and goals of care
If prandial insulin >10 units/dose:
• Decrease dose by 50% and add noninsulin agent§
Titrate prandial insulin doses down as noninsulin agent doses are increased with aim to discontinue prandial insulin
If prandial insulin ≤10 units/dose:
• Discontinue prandial insulin and add noninsulin agent(s)§
If 50% of the fasting finger-stick glucose values are over the goal:
• Increase dose by 2 units
If >2 fasting finger-stick values/week are <80 mg/dL (<4.4 mmol/L):
• Decrease dose by 2 units
Add noninsulin agents§:
• If eGFR is ≥45 mL/min/1.73 m², start metformin 500 mg daily and increase dose every 2 weeks, as tolerated
• If eGFR is <45 mL/min/1.73 m², individual is already taking metformin, or metformin is not olerated, proceed to second-line agent
Additional Tips
• Do not use rapid- and short-acting insulin at bedtime
• While adjusting prandial insulin, a simplified sliding scale may be used, for example:
◦ For premeal glucose >250 mg/dL (>13.9 mmol/L), give 2 units of short- or rapid-acting insulin
◦ For premeal glucose >350 mg/dL (>19.4 mmol/L), give 4 units of short- or rapid-acting insulin
• Stop sliding scale when not needed daily
Using Individual comorbidities (e.g., CKD, ASCVD, low body weight, and risk of dehydration) and drug characteristics to guide decision-making, as depicted in Fig. 9.3 and Table 9.2, select additional agent(s) as needed:
• Every 2 weeks, adjust insulin dose and/or add glucose-lowering medications based on finger-stick glucose testing performed before lunch and before dinner
• Goal: 90–150 mg/dL (5.0–8.3 mmol/L) before meals; may change goal based on overall health and goals of care||
• If 50% of premeal finger-stick values over 2 weeks are above goal, increase the dose or add another agent
• If >2 premeal finger-stick values/week are <90 mg/dL (<5.0 mmol/L), decrease the dose of medication

Figure 13.2—Algorithm to simplify insulin administration plans in older individuals. ASCVD, atherosclerotic cardiovascular disease; CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate. *Basal insulins: glargine U-100 and U-300, detemir, degludec, and human NPH. †Prandial insulins: short-acting (regular human insulin) or rapid-acting (lispro, aspart, and glulisine). ‡Premixed insulins: 70/30, 75/25, and 50/50 products. §Examples of noninsulin agents include metformin, sodium–glucose cotransporter 2 inhibitors, dipeptidyl peptidase 4 inhibitors, and glucagon-like peptide 1 receptor agonists. ||See **Table 13.1**. Figure was adapted with permission from Munshi et al. (109).

diabetes and established atherosclerotic cardiovascular disease (ASCVD) and those at higher ASCVD risk, and newer trials are expanding our understanding of their benefits in other populations (122). See Section 9, "Pharmacologic Approaches to Glycemic Treatment," and Section 10, "Cardiovascular Disease and Risk Management," for a more extensive discussion regarding the specific indications for this class of agents. In a systematic review and meta-analysis of GLP-1 RA trials, these agents have been found to reduce major adverse cardiovascular events, cardiovascular deaths, stroke, and myocardial infarction to the same degree for people over and under 65 years of age (123). While the evidence for this class of agents for older adults continues to grow, there are a number of practical issues that should be considered specifically for older people. These drugs are injectable agents (with the exception of oral semaglutide) (124), which require visual, motor, and cognitive skills for appropriate administration, although most of them have a weekly dosing schedule. GLP-1 RAs may also be associated with nausea, vomiting, diarrhea, or constipation and should be titrated slowly. Given the gastrointestinal side effects of this class, GLP-1 RAs are not preferred in older adults experiencing unexplained weight loss or undernutrition or in those who have recurrent gastrointestinal problems. GLP-1 RAs should be avoided especially in people with problematic constipation, significant gastroparesis, recurrent ileus, or bowel obstruction. Individuals should be monitored regularly for excessive weight loss.

Tirzepatide is a novel dual-acting glucose-dependent insulinotropic polypeptide and GLP-1 RA administered as a once-weekly subcutaneous injection. In phase 3 trials, tirzepatide decreased A1C and weight—generally to a greater extent than other glucose-lowering drugs including semaglutide and insulin—with no significant differences in the safety or efficacy in older compared with younger individuals (125). As the adverse effect profile of tirzepatide is similar to that for GLP-1 RAs, the same precautions for older adults apply (125).

Sodium–Glucose Cotransporter 2 Inhibitors

SGLT2 inhibitors are administered orally, which may be convenient for older adults with diabetes. In those with established ASCVD, these agents have shown cardiovascular benefits (122). This class of agents has also been found to be beneficial for

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Table 13.2—Considerations for treatment plan simplification and deintensification/deprescribing in older adults with diabetes

Characteristics and health status of person with diabetes	Reasonable glycemic goal	Rationale/considerations	When may medication plan simplification be required?	When may treatment deintensification be required?
Healthy (few chronic illnesses, intact cognitive and function)	A1C <7.0–7.5% (<53–58 mmol/mol)	• Healthy individuals can perform complex tasks for glycemic management • During acute illness, individuals may be at risk for administration or dosing errors	• Severe or recurrent hypoglycemia on insulin therapy, regardless of A1C • Wide glucose excursions • Cognitive or functional decline following acute illness	• Severe or recurrent hypoglycemia on insulin, sulfonylureas, or meglitinides, regardless of A1C • Wide glucose excursions • Polypharmacy
Complex/intermediate (multiple chronic illnesses or two or more ADL impairments or mild to moderate cognitive impairment)	A1C <8.0% (<64 mmol/mol)	• Comorbidities may affect self-management abilities and capacity to avoid hypoglycemia	• Severe or recurrent hypoglycemia on insulin therapy, regardless of A1C • Unable to manage complexity of insulin plan • Significant change in social circumstances, such as loss of care partner, change in living situation, or financial difficulties	• Severe or recurrent hypoglycemia on insulin, sulfonylureas, or meglitinides regardless of A1C • Wide glucose excursions • Polypharmacy
Community-dwelling individuals receiving short-term care in a skilled nursing facility	Avoid reliance on A1C, glucose goal 100–200 mg/dL (5.6–11.1 mmol/L)	• Glycemic management is important for recovery, wound healing, hydration, and avoidance of infections • Recovery from acute illness may impair cognitive function • More support may be needed on transition to home	• Consider reinstating prehospitalization treatment if it increased in complexity during hospitalization	• Weight loss, anorexia, short-term cognitive decline, and/or loss of physical functioning
Very complex/poor health (LTC or end-stage chronic illnesses or moderate to severe cognitive impairment or two or more ADL impairments)	Avoid reliance on A1C and avoid hypoglycemia and symptomatic hyperglycemia	• No benefits of tight glycemic goals in this population • Hypoglycemia should be avoided • Most important outcomes are maintenance of cognitive and functional status	• The individual would like to decrease the number of injections and finger-stick blood glucose monitoring • The individual has an inconsistent eating pattern	• Cognitive dysfunction, depression, anorexia, or inconsistent eating pattern while taking sulfonylureas or meglitinides • Taking any diabetes medications without clear benefits
At the end of life	Avoid hypoglycemia and symptomatic hyperglycemia	• Goal is to provide comfort and avoid tasks or interventions that cause pain or discomfort • Care partners are important in providing medical care and maintaining quality of life	• Pain or discomfort caused by treatment (e.g., injections or finger sticks) • Excessive stress of care partners due to treatment complexity	• Taking any diabetes medications without clear benefits in improving symptoms and/or comfort

Treatment plan simplification refers to changing strategy to decrease the complexity of a medication plan (e.g., fewer administration times and fewer blood glucose checks) and decreasing the need for calculations (such as sliding-scale insulin calculations or insulin-carbohydrate ratio calculations). Deintensification/deprescribing refers to decreasing the dose or frequency of administration of a treatment or discontinuing a treatment altogether. ADL, activities of daily living; LTC, long-term care. Created using information from Munshi et al. 2016 (109) and 2017 (161).

people with heart failure and to slow the progression of chronic kidney disease. See Section 9, "Pharmacologic Approaches to Glycemic Treatment," and Section 10, "Cardiovascular Disease and Risk Management," for a more extensive discussion regarding the indications for this class of agents. Stratified analyses of the trials of this drug class indicate that older adults

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have similar or greater benefits than younger people (126–128). SGLT2 inhibitors are generally well tolerated among older adults, although thoughtful selection is needed to avoid adverse effects in individuals at elevated risk (129). SGLT2 inhibitors may cause clinically significant volume depletion, for which older adults are at greater risk, and should be used cautiously in older adults who are frail or prone to orthostasis (130). SGLT2 inhibitors cause a higher rate of genital mycotic infections, especially in women, and may need to be discontinued if this effect becomes burdensome (131). Their use is also associated with a small increase in urinary tract infections; caution should be used in people with recurrent or severe urinary tract infections (131). Because SGLT2 inhibitors typically increase urine volume, symptoms of urinary incontinence should be queried before and after SGLT2 inhibitor initiation (132). Euglycemic diabetic ketoacidosis is a rare but potentially serious phenomenon associated with treatment with SGLT2 inhibitors, especially in those with multimorbidity who reside in post-acute and long-term care (PALTC) settings, with infection being the most common trigger (132,133). There is emerging data that SGLT2 inhibitor use may cause an increase in osteoporotic bone fractures, and although more data are needed, clinicians should consider minimizing SGLT2 inhibitor use in older adults at high fracture risk.

Insulin Therapy

The use of insulin therapy requires that individuals or their caregivers have good visual and motor skills and cognitive ability to manage the appropriate insulin dose using insulin pens or syringes. Insulin therapy relies on the ability of the older person with diabetes to administer insulin on their own or with the assistance of a care partner, to monitor glucose levels, and, eventually, to recognize and treat hypoglycamia. Insulin doses should be titrated to meet individualized glycemic goals and to avoid hypoglycemia.

Once-daily basal insulin injection therapy is associated with minimal side effects and may be a reasonable option in many older adults (134). When choosing a basal insulin, long-acting insulin analogs have been found to be associated with a lower risk of hypoglycemia compared with NPH insulin in the Medicare population. Multiple daily injections of insulin may be too complex for an older person with advanced diabetes complications, life-limiting coexisting chronic illnesses, or limited functional status or social support. Moreover, if affordable, use of insulin pens should be prefered to syringes, mostly in older adults with functional impairment. **Figure 13.2** provides a potential approach to simplification of insulin plans.

Other Factors to Consider

The needs of older adults with diabetes and their care partners should be evaluated to construct a tailored care plan. Inadequate social support and reduced access to long-term services and support may reduce these individuals' quality of life and increase the risk of functional dependency (7). The living situation must be considered as it may affect diabetes management and support needs. Social and instrumental support networks (e.g., adult children and care partners) that provide instrumental or emotional support for older adults with diabetes should be included in diabetes management discussions and shared decision-making.

The need for ongoing support of older adults becomes even greater when transitions to acute care and long-term care (LTC) become necessary. Unfortunately, these transitions can lead to discontinuity in goals of care, errors in dosing, and changes in nutrition and activity (135). Older adults in assisted living facilities may not have support to administer their own medications, whereas those living in a nursing home for short-term rehabilitation or LTC may rely on first-line care partners including nursing and care professionals with variable clinical expertise. Those receiving palliative care (with or without hospice) may require an approach that emphasizes comfort and symptom management while deemphasizing strict metabolic and blood pressure management.

SPECIAL CONSIDERATIONS FOR OLDER ADULTS WITH TYPE 1 DIABETES

Due in part to the success of modern diabetes management, people with type 1 diabetes are living longer, and the population of these people over 65 years of age is growing (136–138). Many of the recommendations in this section regarding a comprehensive geriatric assessment and personalization of goals and treatments are directly applicable to older adults with type 1 diabetes; however, this population has unique challenges and requires distinct treatment considerations (139). Insulin is an essential life-preserving therapy for people with type 1 diabetes, unlike for those with type 2 diabetes. To avoid diabetic ketoacidosis, older adults with type 1 diabetes need some form of basal insulin even when they are unable to ingest meals. Insulin may be delivered through an insulin pump or injections. CGM is approved for use by Medicare and can play a critical role in improving A1C, reducing glycemic variability, and reducing risk of hypoglycemia (45) (see Section 7, "Diabetes Technology," and Section 9, "Pharmacologic Approaches to Glycemic Treatment"). In older people with type 1 diabetes, administration of insulin may become more difficult as complications, cognitive impairment, and functional impairment arise. This increases the importance of care partners in the lives of these individuals. Many older people with type 1 diabetes require placement in PALTC settings (i.e., nursing homes and skilled nursing facilities), and unfortunately staff in these settings are less familiar with CGM devices, insulin pumps, or advanced insulin delivery devices. Nevertheless, a feasibility study in LTC facilities showed that CGM can be useful in older adults with diabetes, although it requires substantial staff training (140). Furthermore, an observational study of older adults with diabetes living in LTC facilities using CGM revealed a high prevalence of hypoglycemia both in people using insulin and in those using sulfonylureas, thus showing that this population of older adults in LTC facilities are at increased risk for hypoglycemia (141). Therefore, using CGM can provide useful and more prompt information on hypoglycemia in this vulnerable population. Of note, a recent randomized controlled trial in LTC facilities showed that real-time CGM use for up to 60 days was safe and effective in guiding insulin doses compared with BGM by point of care. There were no differences in TIR, time below range, or mean glucose levels (142). Some staff may be less knowledgeable about the differences between type 1 and type 2 diabetes. Diabetic ketoacidosis may be mistaken for sepsis, end-organ failure, or other electrolyte abnormalities. In these instances, the individual or their family may be more familiar with their diabetes management plan than the staff or health care professionals. Education of

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relevant support staff and health care professionals in rehabilitation and PALTC settings regarding insulin dosing and use of pumps and CGM is recommended as part of general diabetes education (see Recommendations 13.18 and 13.19).

TREATMENT IN POST-ACUTE AND LONG-TERM CARE SETTINGS

Recommendations

13.18 Recommend diabetes education/training (including that for CGM devices, insulin pumps, and advanced insulin delivery systems) for the staff of long-term care and rehabilitation facilities to improve the management of older adults with diabetes. **E**

13.19 People with diabetes residing in long-term care facilities need careful assessment of mobility, mentation, medications, and management preferences to establish individualized glycemic goals and to make appropriate choices of glucose-lowering agents and devices (including CGM devices, insulin pumps, and advanced insulin delivery systems) based on their clinical and functional status. **E** See **Fig. 13.1** for the 4Ms framework to address person-specific issues that affect diabetes management in older individuals.

Management of diabetes in the LTC setting is unique. Individualization of health care is important for all people with diabetes; however, practical guidance is needed for health care professionals as well as the LTC staff and care partners (143,144). Training should include diabetes detection and institutional quality assessment. PALTC facilities should develop their own policies and procedures for prevention, recognition, and management of hypoglycemia. With the increased longevity of populations, the care of people with diabetes and its complications in PALTC is an area that warrants greater study.

Resources

Staff of PALTC facilities should receive appropriate diabetes education to improve the management of older adults with diabetes. Treatments for each person with diabetes should be individualized. Special management considerations include the need to avoid both hypoglycemia and the complications of hyperglycemia (2,145). For more information, see the ADA position statement "Management of Diabetes in Long-term Care and Skilled Nursing Facilities" (135,143,144).

Nutritional Considerations

An older adult residing in a PALTC facility may have irregular and unpredictable meal consumption, undernutrition, anorexia, and impaired swallowing. Furthermore, therapeutic nutrition plans or modified food consistencies may inadvertently lead to decreased food intake and contribute to unintentional weight loss and undernutrition. Meals tailored to a person's culture, preferences, and personal goals may increase quality of life, satisfaction with meals, and nutrition status (146). It may be helpful to give insulin immediately after meals to ensure that the dose is appropriate for the amount of carbohydrate the individual consumed in the meal.

Hypoglycemia

Older adults with diabetes in PALTC are especially vulnerable to hypoglycemia. They have a disproportionately high number of clinical complications and comorbidities that can increase hypoglycemia risk: impaired cognitive and renal function, slowed hormonal regulation and counterregulation, suboptimal hydration, variable appetite and nutritional intake, requirement for feeding assistance, polypharmacy, and slowed intestinal absorption (147). Oral agents may achieve glycemic outcomes similar to basal insulin in PALTC populations (100,148). CGM may be a useful approach to monitoring for hypoglycemia among individuals treated with insulin in LTC, but the data are limited.

Another consideration for the PALTC setting is that unlike in the hospital setting, health care professionals are not required to evaluate individuals daily. According to federal guidelines, at a minimum, assessments should be done at least every 30 days for the first 90 days after admission and then at least once every 60 days and as clinically indicated. Although in practice individuals may actually be seen more frequently, the concern is that these individuals may have poorly managed glucose levels or wide excursions without the practitioner being notified. Health care professionals may adjust treatment plans by telephone, fax, or in person directly at the PALTC facilities, provided they are given timely notification of blood glucose management issues from a standardized alert system.

The following alert strategy could be considered:

1. Call a health care professional immediately in cases of low blood glucose levels (<70 mg/dL [<3.9 mmol/L]). However, treatment of hypoglycemia should not be delayed.
2. Call as soon as possible when
   a) glucose values are 70–100 mg/dL (3.9–5.6 mmol/L) (treatment plan may need to be adjusted),
   b) two or more blood glucose values >250 mg/dL (>13.9 mmol/L) are observed within a 24-h period accompanied by a significant change in clinical status,
   c) glucose values are consistently >250 mg/dL (>13.9 mmol/L) within a 24-h period,
   d) glucose values are consistently >300 mg/dL (>16.7 mmol/L) over 2 consecutive days,
   e) any reading is too high for the glucose monitoring device, or
   f) the individual is sick, with symptomatic hyperglycemia, vomiting, fever, lethargy, or poor oral intake.

END-OF-LIFE CARE

Recommendations

13.20 When palliative care is needed in older adults with diabetes, health care professionals should initiate conversations with people with diabetes and their care partners regarding the goals and intensity of care. Strict glucose and blood pressure management are not necessary, and simplification of medication plans can be considered. Similarly, the intensity of lipid management can be relaxed, and withdrawal of lipid-lowering therapy may be appropriate. **E**

13.21 Prioritize the overall comfort, prevention of distressing symptoms, and preservation of quality of life and dignity as primary goals for diabetes management at the end of life. **C**

Management of the older adult receiving palliative medicine or hospice care at the end of life is a unique situation. Overall, palliative medicine promotes comfort, symptom management and prevention

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(pain, hypoglycemia, hyperglycemia, and dehydration), and preservation of dignity and quality of life in older adults with limited life expectancy (145,149).

In the setting of palliative care, health care professionals should initiate conversations with people with diabetes and their care partners regarding the goals and intensity of diabetes care; strict glucose and blood pressure management may not be consistent with achieving comfort and quality of life. Avoidance of severe hypertension and hyperglycemia aligns with the goals of palliative care. In a multicenter trial, withdrawal of statins among people with diabetes in palliative care was found to improve quality of life (150–152). The evidence for the safety and efficacy of deintensification protocols in older adults is growing for both glucose and blood pressure management (104,153) and is clearly relevant for palliative care. An individual has the right to refuse testing and treatment, whereas health care professionals may consider withdrawing treatment and limiting diagnostic testing, including a reduction in the frequency of blood glucose monitoring (154,155). CGM could be considered when frequent blood glucose testing is burdensome but monitoring for hypoglycemia and hyperglycemia is needed. Glycemic goals should aim to prevent hypoglycemia and hyperglycemia. Treatment interventions need to be mindful of quality of life. Careful monitoring of oral intake is warranted. The decision process may need to involve the individual, family, and care partners, leading to a care plan that is both convenient and effective for the goals of care (156). The pharmacologic therapy may include oral agents as first line, followed by a simplified insulin plan. If needed, basal insulin can be implemented, accompanied by oral agents and without rapid-acting insulin. Agents that can cause gastrointestinal symptoms such as nausea or excess weight loss may not be good choices in this setting. As symptoms progress, some agents may be slowly tapered and discontinued.

Different categories have been proposed for diabetes management in those with advanced disease (70).

1. A stable individual: Continue with the person's previous medication plan, with a focus on *1*) the prevention of hypoglycemia and *2*) the management of hyperglycemia using blood glucose monitoring, keeping levels below the renal threshold of glucose, and hyperglycemia-mediated dehydration. There is no role for A1C monitoring.
2. An individual with organ failure: Preventing hypoglycemia is of greatest significance. Dehydration must be prevented and treated. In people with type 1 diabetes, insulin administration may be reduced as the oral intake of food decreases but should not be stopped. For those with type 2 diabetes, agents that may cause hypoglycemia should be reduced in dose. The main goal is to avoid hypoglycemia, allowing for glucose values in the upper level of the desired goal range.
3. A dying individual: For people with type 2 diabetes, the discontinuation of all medications may be a reasonable approach, as these individuals are unlikely to have any oral intake. In people with type 1 diabetes, there is no consensus, but a small amount of basal insulin may maintain glucose levels and prevent acute hyperglycemic complications and symptom burden.

Finally, diabetes health care professionals are well positioned to support people with diabetes in advance care planning. Health care professionals can assist people with diabetes in clarifying and documenting their values, preferences, and goals for care in an advance care plan (157). Advance care plans are guides and decision aids to help health care professionals and care partners make difficult treatment decisions when the person with diabetes is no longer able to make decisions for themselves. Research shows that people with diabetes want to discuss end-of-life care plans with their health care professional (158). Two validated tools exist to support health care professionals in this process: the Supportive and Palliative Care Indicators Tool (159) and the Gold Standards Framework Proactive Identification Guidance (160).

In conclusion, the management of diabetes in older adults at the end of life necessitates a person-centered approach that prioritizes comfort, symptom management, quality of life, and the preservation of dignity.

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